

Undergraduate Students' Preferences of Knowledge to Solve Particle Mechanics Problems

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This study explores the nature of undergraduate students' errors and misconceptions in particle mechanics. This paper provides in-depth descriptions of the errors presented by students and accounts for them in terms of students' procedural or conceptual knowledge. Specifically, this study analyses students' written responses to questions on dynamics and the conservation of momentum. A total of 154 student scripts in 2005 and 142 scripts in 2006 were analysed for errors and misconceptions regarding these mechanics concepts. In addition, a questionnaire was administered to students on which they stated which type of knowledge (procedural or conceptual) was more useful in answering these questions. Overall, the findings of this study suggest that students make regular errors for which there are complex causes. It was also found that students' procedural and conceptual knowledge of a subject has a bearing on the errors and misconceptions that they make. The paper concludes with some suggestions for how errors and misconceptions can be diagnosed and analysed. It highlights the importance of error analysis as a teaching skill.

Key words: Particle mechanics; Errors; Misconceptions; Procedural knowledge; Conceptual knowledge